



(IMP) was recorded. The X_{50} values, SMW, TMW and IMP of the experimental conditions were compared by repeated measures analysis of variance.

Result:

The X_{50} values were smaller for BS than for ND and SS ($p < 0.001$). The SMW of the working side masseter muscle was decreased by ~10 percent in the BS group as compared to ND and SS ($p < 0.05$), while the TMW was not changed in the BS group. There were no significant differences between the ND and SS groups for all target variables.

Conclusion: These findings point to a reduction of performance, whereas the effort of the masticatory system remains unchanged. This may reflect adaptation strategies used for instance immediately after the incorporation of dental restorations.

451 (180692)

Cortical and subcortical control during chewing: an fMRI study M.G. PIANCINO, University of Turin, Torino, Italy, [G. ISOLA](#), Orthodontics and Gnathology, University of Turin, Messina, Italy, D. MILARDI, University of Messina, Messina, Italy, P. BRACCO, Surgical Sciences, University of Turin, Turin, Italy, P. BRAMANTI, Director Institute IRCSS Neurolesi "Bonino-Pulejo" Messina, Messina, Italy, and G.P. ANASTASI, Dean Department of Biomedical Imaging, University of Messina Italy, Messina, Italy

Objectives: Mastication is a highly coordinated neuromuscular function, involving cortical and subcortical structures. Currently, the subcortical activations, during chewing, has been little investigated in literature. The present fMRI study aimed to evaluate the activation of cortical mastication areas and subcortical structures during chewing deliberately and nondeliberately with soft and hard boluses.

Methods: Eight volunteers healthy subjects, with normal occlusion between 22 and 36 years of age were selected for the study. A unique high-resolution structural image and functional echoplanar images were acquired per run on a 3 T scanner during mastication of a soft bolus and a hard bolus.

Results: In all subjects, gum-chewing was associated with significant increases in the BOLD signal in various regions of the brain. During the deliberately and nondeliberately chewing a BOLD increase was shown bilaterally in the following structures: primary sensorimotor cortex, the Brodmann areas 3, 6, 10, 13, 20, 21, 22, 27, 28, 32, 36, 37, 38 and also the caudate nucleus, putamen, pallidum, amygdala, thalamus and cerebellum, the corpus callosum and the hippocampus.



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Conclusions: The involvement of cortical and subcortical areas and structures, during chewing, is very complex. A deeper understanding of the motor control neurophysiology of mastication is important to understand the brain network involving motor control and cognitive processes.

459 (179276)

Antibacterial property of New Apatite-Ionomer Cement for ART Sealants [Y. SHINONAGA](#), T. NISHIMURA, H. CHIU, S. CHIU, and K. ARITA, Department of Pediatric Dentistry, Osaka Dental University, Osaka, Japan

Objective: Pit and fissure sealants are effective for preventing caries in children. However, a barrier to providing sealants is concern about inadvertently sealing over caries. Therefore, sealing materials should have antibacterial properties. Glass ionomer cement (GIC) is a unique functional material in the field of dentistry due to favorable clinical properties, such as chemical bonding, fluoride release and biocompatibility which are desirable for pit and fissure sealant. We have recently developed a new apatite-ionomer cement (AIC) as sealing materials.

The aim of this study was to evaluate the mechanical and chemical properties of newly developed AIC.

Methods: Commercial glass ionomer sealant ((Fuji III™, GC Co., Tokyo, Japan) was the control and base material. Twenty eight weight percent of hydroxyapatite (HAP: spherical shaped HAP, Taihei Chemical Industrial, Inc., Osaka, Japan) was added into the glass ionomer powder. Specimens were fabricated the fractural strength and eluted fluoride ion concentration were measured. In addition, an antibacterial test for *Streptococcus mutans* ATCC25175 (*S. mutans*) was performed by the ATP luminescence method.

Results: The addition of HAP into GIC led to significantly higher strength after 1h, 24h and 1y from mixing and to significantly increase the fluoride release abilities of the cement. The luminescence intensity of *S. mutans* in culture fluid with AIC was significantly lower than that in culture fluid with control ($P < 0.01$).

Conclusion: These results indicate that AIC has higher antibacterial properties and may be effective in reducing caries progression by sealing it on the non-cavitated caries.

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